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# UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. BEIERSDORF 606-WCG

First Inventor or Application Identifier Detlef GROTH

Title [ See "Appendix"]

Express Mail Label No. EE473057642US

PTD

09-9649  
02/02/00

## APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1.  \* Fee Transmittal Form (e.g., PTO/SB/17)  
(Submit an original and a duplicate for fee processing)
2.  Specification [Total Pages 8]
  - Descriptive title of the Invention
  - Cross References to Related Applications
  - Statement Regarding Fed sponsored R & D
  - Reference to Microfiche Appendix
  - Background of the Invention
  - Brief Summary of the Invention
  - Brief Description of the Drawings (if filed)
  - Detailed Description
  - Claim(s)
  - Abstract of the Disclosure
3.  Drawing(s) (35 U.S.C. 113) [Total Sheets 2]
4. Oath or Declaration [Total Pages  ]
- a.  Newly executed (original or copy)
- b.  Copy from a prior application (37 C.F.R. § 1.63(d))  
(for continuation/divisional with Box 16 completed)
  - i.  **DELETION OF INVENTOR(S)**  
Signed statement attached deleting  
inventor(s) named in the prior application,  
see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

\*NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).

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5.  Microfiche Computer Program (Appendix)
6. Nucleotide and/or Amino Acid Sequence Submission  
(if applicable, all necessary)
  - a.  Computer Readable Copy
  - b.  Paper Copy (identical to computer copy)
  - c.  Statement verifying identity of above copies

## ACCOMPANYING APPLICATION PARTS

7.  Assignment Papers (cover sheet & document(s))
8.  37 C.F.R. § 3.73(b) Statement  Power of  
(when there is an assignee)  Attorney
9.  English Translation Document (if applicable)
10.  Information Disclosure Statement (IDS)/PTO-1449  Copies of IDS  
Citations
11.  Preliminary Amendment
12.  Return Receipt Postcard (MPEP 503)  
(Should be specifically itemized)
13.  \* Small Entity Statement(s)  Statement filed in prior application,  
(PTO/SB/09-12)  Status still proper and desired
14.  Certified Copy of Priority Document(s)  
(if foreign priority is claimed)
15.  Other: .....

16. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:

 Continuation  Divisional  Continuation-in-part (CIP) of prior application No: \_\_\_\_\_ / \_\_\_\_\_

Prior application information: Examiner \_\_\_\_\_

Group / Art Unit: \_\_\_\_\_

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

## 17. CORRESPONDENCE ADDRESS

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Attorney Docket No. : Beiersdorf 606-WCG  
: 6713-St-bb

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant(s) : Detlef GROTH, Arne KOOPS, Axel BURMEISTER, Jochen STÄHR  
Serial No. : To Be Assigned  
Filed : Herewith  
For : ANTICOUNTERFEIT, LASER-MARKABLE LABEL PRODUCED BY DIFFRACTION GRATINGS  
Art Unit : To Be Assigned  
Examiner : To Be Assigned

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February 2, 2000

BOX PATENT APPLICATIONS  
Hon. Assistant Commissioner  
for Patents  
Washington, D. C. 20231

**PRELIMINARY AMENDMENT**

Sir:

Prior to examination, please amend the above-identified application as follows:

**IN THE ABSTRACT**

Please cancel the abstract and substitute the abstract annexed as a separate page hereto.

**IN THE CLAIMS**

Claim 2 (amended).      Process according to Claim 1, [characterized in that]

wherein the support foil [consists of] is a permanently embossed thermoset or thermoplastic material.

Claim 3 (amended).      Process according to [Claims 1 and 2, characterized in that] Claim 1, wherein the support foil [consists of] is a polyester or polyamide.

Claim 4 (amended).      Process according to [Claims 1 to 3, characterized in that] Claim 1, wherein the sheet is extruded, coated or cast onto the support foil.

Claim 5 (amended).      Process according to [Claims 1 to 4, characterized in that] Claim 1, wherein the sheet [consists of] is a coating film [which in particular is subsequently] and is subjected to electron beam curing.

Claim 6 (amended).      Process according to Claim 5, [characterized in that] wherein the coating film has a thickness of from 0.5 to 30  $\mu\text{m}$ [, in particular from 5 to 15  $\mu\text{m}$ ].

Claim 7 (amended).      Process according to [Claims 1 to 6, characterized in that] Claim 1, wherein an additional adhesive layer of from 5 to 70  $\mu\text{m}$  in thickness is arranged on the sheet and, [if required] optionally, a release paper is arranged on [this] said adhesive layer.

Claim 8 (amended).      A [S]heet [obtainable by a process according to at least one of the preceding claims] prepared according to the process of Claim 1.

REMARKS

This preliminary amendment is being filed to conform the claims and abstract to conventional format, and to eliminate multiple dependency.

Favorable action is respectfully solicited.

ADDITIONAL FEE

Please charge any insufficiency of fees, or credit any excess, to Deposit Account No. 14-1263.

Respectfully submitted,

NORRIS, McLAUGHLIN & MARCUS, P.A.

By   
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## ABSTRACT

Process for producing an anticounterfeit label having a holographic image, and labels produced according to the process.

## APPENDIX

BEIERSDORF 606-WCG

**TITLE:**

ANTICOUNTERFEIT, LASER-MARKABLE LABEL PRODUCED BY DIFFRACTION GRATINGS

**LIST OF INVENTORS:**

1. Detlef GROTH
2. Arne KOOPS
3. Axel BURMEISTER
4. Jochen STÄHR

"Express Mail" Mailing Label No. EE473057642US

Date of Deposit: February 2, 2000

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

NORRIS, McLAUGHLIN & MARCUS, P.A.

By:

**Description**

**Anticounterfeit, laser-markable label produced by diffraction gratings**

- 5 The invention relates to a process, and to its resultant products, for producing an anticounterfeit label which bears an optically active image produced by means of diffractive structures.

Since technically it is very complex to copy holograms, they are nowadays used, for  
10 example, on the widespread chipcards (ec card) and banknotes.

The known processes for producing labels with diffraction gratings and holograms are very complex and costly.

- 15 Primarily, diffractive or holographic structures are transferred by means of an embossing process (for example Holosecure with shim) or printing process (for example Holoprint) to a sheet backing, and in a subsequent step are rendered visible by the application of a metallic film.

- 20 One way of transferring the holographic metallic film to the backing material (for example concert tickets, banknotes) is by means of a hot embossing process. A disadvantage of these labels is that they possess a high level of susceptibility to mechanical and environmental effects. Under conditions of normal use, they may lose their optical properties, and so it cannot be ascertained whether the loss is an  
25 indication of counterfeiting or of copious usage.

For this reason, labels with a protective laminate are used in order to counter these disadvantages.

- 30 Hologram sheets of this kind have the following structure:

- Backing sheet made, for example, of polyethylene terephthalate (PET) with a thickness of preferably 12 µm, to which a structured coating film is applied

- Metal film of from 1 to 10 nm (for example, vapour-coated aluminium)
- Adhesive layer with a preferred thickness of between 10 and 25 µm.

This multilayer structure fulfils its purpose, since the resulting product is mechanically

5 more resistant.

Nevertheless, this structure has a tendency for the individual layers to separate - that is, a tendency towards delamination - and so, as a result of the destruction brought about through usage, the identification of authenticity is no longer possible.

All of these methods are applied to the surface and therefore can be used only in an

10 extremely limited manner if at all for the known laser labels which are used, for example, for identification plates, since then the extremely resistant surface of high optical quality is altered and impaired. Furthermore, the application of an additional layer as described above prevents markability and cutability by means of a NdYAG laser.

15

The object of the invention is to provide a process for producing a sheet having a hologram without the known disadvantages of the prior art.

This object is achieved by means of a process as set out in accordance with Claim 1.

20 The subclaims relate to particularly advantageous embodiments of the process and to a sheet having a hologram and obtainable by the process of the invention.

Accordingly, the invention provides a process for producing a sheet, in which first of all a support foil is embossed by means of an embossing tool, the embossing tool having 25 holographic structures, and then a sheet is produced on the embossed support foil so that the structure is transferred to the sheet and results in at least one hologram.

Therefore, the side of the embossing tool facing the material to be embossed is shaped so as to give a structure which comprises a diffraction grating or a holographic 30 image.

Since this hologram is produced in the sheet itself, there is no harmful multilayer structure and the diffraction grating produced in this way possesses the same resistance and laserability as the sheet itself.

35

In one advantageous embodiment the support foil consists of a permanently embossed thermoset or thermoplastic material, in particular polyester or polyamide.

The support foil preferably has a thickness of from 12 to 500 µm, in particular 50 µm.

The support foil can be provided with a very wide variety of motifs, examples being  
5 company logos or advertising. The embossing of the support foil produces a negative  
impression on the visible surface of the sheet of the invention.

The embossing of the support foil can be carried out, for example, in varying thickness  
and/or depth using a metal embossing die. The depth of embossing is dependent on  
the embossing pressure set, which acts on the magnetic cylinder used in the  
10 embossing process, and counterpressure cylinder.

In a further advantageous embodiment, the sheet is extruded, coated or cast onto the  
support foil.

15 The sheet preferably consists of a coating film, which in particular is subsequently  
subjected to electron beam curing.

Four types of coating material can be used in principle for the object of the invention,  
provided that their stability is sufficient: for example, acid-curing alkyd-melamine  
20 resins, addition-crosslinking polyurethanes, free-radically curing styrene coating  
materials, and the like. Particularly advantageous, however, are radiation-curing  
coating materials, since they cure very rapidly without laborious evaporation of  
solvents or the action of heat. Such coating materials have been described, for  
example, by A. Vrancken (Farbe und Lack 83, 3 (1977) 171).

25 Furthermore, the coating film preferably has a thickness of from 0.5 to 30 µm, in  
particular from 5 to 15 µm.

30 The coating film employed with preference is applied to the embossed support foil and  
is cured under effectively oxygen-free conditions by the action of an electron beam of  
high energy (from 150 to 500 kV).

Furthermore, the coating film is preferably multilayer, and the layers consist of cured,  
i.e. crosslinked coating material: in particular, they comprise an upper coating film  
35 which is from 1 to 20 µm thick, is applied without solvent and is cured by means of  
electron beams, and a lower coating film which is from 20 to 500 µm thick, is applied  
without solvent and is cured by means of electron beams.

In a further advantageous embodiment, an additional adhesive layer of from 5 to 70 µm, in particular from 10 to 30 µm, in thickness is arranged on the sheet and, if required, a release paper is arranged on this adhesive layer.

- 5 The third layer, comprising a pressure-sensitive adhesive, hot-melt adhesive or reactive adhesive or the like, is provided for bonding to a substrate.

Finally, the concept of the invention embraces a sheet obtainable by a process as described above.

10 The sheet produced in accordance with the process of the invention features a large number of advantages such as were not foreseeable for the person skilled in the art.

On the basis of the holograms, the sheet is rapidly identifiable, the holograms being visible optically but virtually intangible. Therefore, essentially no haptic impression is

15 produced.

Using the sheet, the presentation of holograms even on a black substrate is possible for the first time.

The invention will be elucidated below with reference to two working examples, without

20 being restricted thereto.

Figure 1 shows the embossing of the support foil and

Figure 2 shows the structure of the sheet of the invention.

25 According to Figure 2, the desired holograms are first of all embossed on a support foil 1 and comprise, for example, the company logo of the manufacturer of the sheet of the invention.

This is done using a roller 4 on which a metal embossing die 3 is fastened. The embossing die 3 has appropriate diffraction gratings.

30 The support foil 1 is guided along under the roller 4, which rotates in the direction of the arrow and is pressed onto the support foil 1 at a pressure of 500 to 2000 psi.

The support foil 1 carries the individual embossing lines 11, whose largest spacing A always has a width of less than 20 µm.

Figure 2 shows how a coating film 2 has been cast and distributed on the previously embossed support foil 1. In the coating film 2, this produces embossed patterns whose width B is substantially identical to the distance A.

- 5 Following the removal of the sheet from the support film 1, it is possible to identify holograms, which in this case leave no haptic impression, on the sheet obtained from the process of the invention.

### Example 1

10

A commercial polyurethane acrylate made from long-chain polyesterdiol, aliphatic diisocyanate and terminal acrylic groups (molecular weight approximately 1500, functionality 2) is mixed with 20% hexanediol bisacrylate. This gives a liquid with a high viscosity of about 10 Pa\*s. This liquid is used to prepare:

15

- a black paste A by grinding with 12% of carbon black FCF (average particle diameter 23 µm) on a triple-roll mill, and
- a white paste B by grinding 45% of an Al and Si stabilized rutile pigment ( $TiO_2$  content 90%, density 3.9 g/cm<sup>3</sup>).

20

Paste A is coated in a thickness of 10 µm onto a 50 µm thick, biaxially oriented and embossed polyester sheet and cured under inert gas by means of an electron beam 350 keV with a dose of 80 kGy.

25

Atop this there is applied a white paste B with a thickness of 50 µm, and curing is again carried out under inert gas with the electron beam, with a dose of 3 Mrad.

30

This product is coated with a pressure-sensitive adhesive in accordance with DE-OS 15 69 898, so that after drying the film has a thickness of 20 µm. The pressure-sensitive adhesive is lined with commercial release paper.

Subsequently, the polyester sheet is removed so that the embossed and otherwise mirror-smooth black surface of the product appears.

35

This surface is capable of rapid marking with a bar code, for example, using a controllable outlet laser. The contrast is so high that the code can be read without error using an evaluation device from a distance of 1 m.

Heating of the material at 200°C for 1 hour results in shrinkage of less than 1% in the lengthwise and transverse directions. Immersion in water and/or weathering in a Weatherometer for 500 h results in no adverse effects.

Claims

1. Process for producing a sheet, in which first of all a support foil is embossed by means of an embossing tool, the embossing tool having holographic structures, and then a sheet is produced on the embossed support foil so that at least one hologram is produced on the sheet.
2. Process according to Claim 1, characterized in that the support foil consists of a permanently embossed thermoset or thermoplastic material.
3. Process according to Claims 1 and 2, characterized in that the support foil consists of polyester or polyamide.
4. Process according to Claims 1 to 3, characterized in that the sheet is extruded, coated or cast onto the support foil.
5. Process according to Claims 1 to 4, characterized in that the sheet consists of a coating film which in particular is subsequently subjected to electron beam curing.
6. Process according to Claim 5, characterized in that the coating film has a thickness of from 0.5 to 30 µm, in particular from 5 to 15 µm.
7. Process according to Claims 1 to 6, characterized in that an additional adhesive layer of from 5 to 70 µm in thickness is arranged on the sheet and, if required, a release paper is arranged on this adhesive layer.
8. Sheet obtainable by a process according to at least one of the preceding claims.

**Abstract**

Process for producing a sheet, in which first of all a support foil is embossed by means of an embossing tool, the embossing tool having holographic structures, and then a sheet is produced on the embossed support foil so that at least one hologram is produced on the sheet.

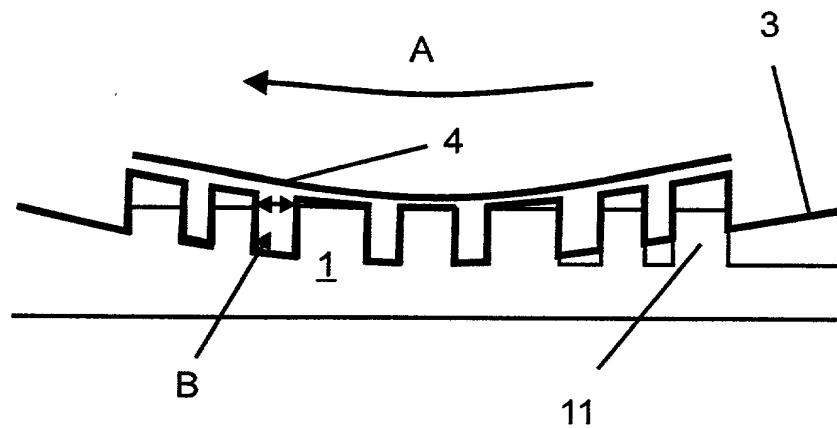


Figure 1

9

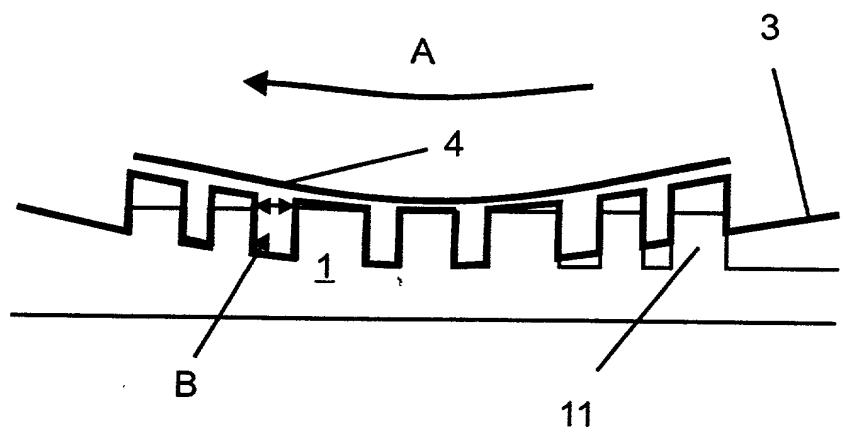


Figure 1

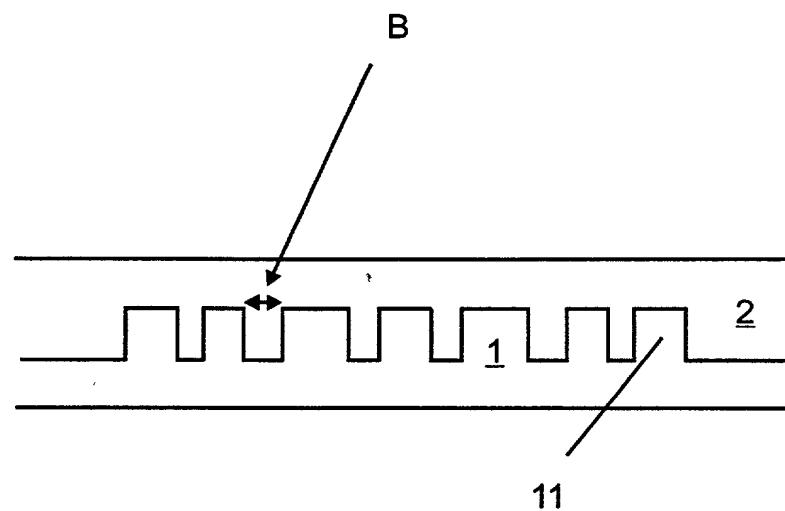


Figure 2